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(54) Title  
NOISE ABATEMANT SUPERHARD MATERIAL IMPREGNATED SAW

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(57) Claim

1. A cutting blade for a circular saw, said blade comprising a base with a cutting edge around the periphery which is impregnated with superhard material and a bore at the centre thereof for mounting on a saw drive shaft wherein a plurality of noise damping apertures are formed through the area of the base between said centre bore and said cutting edge, the area of said apertures comprising at least 5% of the area of the blade whereby the opposing edges of said apertures remain separated at working temperatures and the sum of the circumferential angles of the sectors delimited by said apertures being at least 360°.

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# COMPLETE SPECIFICATION

FOR A PETTY PATENT

ORIGINAL

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## TO BE COMPLETED BY APPLICANT

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Invention Title: ..... NOISE ABATEMENT SUPERHARD MATERIAL IMPREGNATED CIRCULAR SAW .....

Details of Associated Provisional Applications: Nos: ..... None .....

The following statement is a full description of this invention, including the best method of performing it known to me:-

This invention relates to improvements in circular cutting blades for saws. More particularly although not exclusively it discloses an improved superhard material impregnated cutting blade.

Prior art superhard material impregnated circular saw blades as shown in figure 1 are typically used to cut through stone, porcelain, concrete, brick, glass, metal and other materials which are hard and brittle. Such blades may consist of a circular base 1 and a superhard material cutting edge 2 around the blade circumference. The base 1 may also be formed with a centre bore 3 for the saw drive shaft and a smaller offset hole 4 for use when installing the blade. There may also be a row of holes or slots 5 adjacent the edge 2 for dry cutting. The cutting process when using such prior art blades generates high noise intensity. This is caused by the rotating edge 2 rubbing and impacting against the material being cut. The noise waves or vibrations so generated propagate or spread through the blade and thence into the surroundings to the extent that they can become a health or safety hazard to persons in the vicinity of the saw.

It is an object of this invention to ameliorate the aforementioned disadvantages and accordingly there is disclosed a cutting blade for a circular saw, said blade comprising a circular base with a cutting edge around the periphery which is impregnated with superhard material and a bore at the centre thereof for mounting on a saw drive shaft

wherein a plurality of noise damping apertures are formed through the area of said base between said centre bore and said cutting edge, the area of said apertures comprising at least 5% of the area of the blade whereby the opposing edges of said apertures remain separated at working temperatures and the sum of the circumferential angles of the sectors delimited by said apertures being at least 360°.

It is preferred that the space between adjacent apertures be between 5% and 10% of the diameter of the blade.

It is further preferred that said apertures comprise geometric curves including circular arcs or circular arcs with straight lines.

It is still further preferred that the blade include a plurality of equally spaced holes or slots adjacent said cutting edge for dry cutting operations and that said apertures be located in an area between said centre bore and said holes or slots.

The currently preferred embodiment of this invention will now be described with reference to the attached drawings in which:

Figure 2 is a side view of one form of cutting blade according to the invention with part of the blade area shown with said apertures,

Figure 3 shows a second form of blade according to this invention, and

Figure 4 is a further side view of a blade according to this invention showing examples of the circumferential angles of some of the apertures.

Referring first to figure 2 there is shown a circular saw blade for the cutting of hard or brittle materials such as stone, glass, brick and the like. The blade comprises a base 6 with a cutting edge 7 around the periphery consisting of a superhard material that is known in the art. There is also a central bore 8 to receive the saw drive shaft and a smaller offset hole 9 for use when installing the blade. There may also be a row of radial slots 10 adjacent the cutting edge 7 which are necessary for dry cutting operations.

In accordance with this invention a plurality of apertures 11 are formed through the blade base section between the bore 8 and the slots 10. For simplicity of illustration the apertures 11 are shown in the drawings through only one quadrant however in practice they would be formed around the whole blade. These apertures may be of any geometric shape as shown and the number may vary according to application. For example said apertures may be in the form of circles, circular arcs or even straight or curved line openings.

The total area of the apertures 11 should comprise at least

5% of the blade area to achieve significant noise damping or reduction. Also, it is preferred that the spaces provided between adjacent apertures be between 5% and 10% of the diameter of the blade as closer spacing than this can reduce the blade strength to an undesirable level.

Figure 3 shows a second embodiment of a cutting blade according to this invention. The same reference numerals have been used here as in figure 2 for corresponding components. In this case however the radial slots at the periphery of the blade have been replaced with holes 12.

As best shown in figure 4 the circumferential angles of the sectors delimited by the respective apertures 11 should also total at least 360° in order to obtain significant useful damping and noise reduction. More particularly,

$$N1(\alpha A) + N2(\alpha B) + N3(\alpha C) + N4(\alpha D) \geq 360^\circ$$

Where: N1 - No. of apertures of type A

N2 - No. of apertures of type B

N3 - No. of apertures of type C

N4 - No. of apertures of type D

The following table shows the results of tests conducted on superhard material impregnated saw blades according to this invention (Group II) as compared with prior art blades (Group I) having the same diameter, cutting edges, base and cutting speed. The Group II blades were in accordance with this

invention provided with geometrically shaped apertures as described above and had a measured noise index 5db and 7db lower respectively at 250 Hz and 8000 Hz than prior art blades.

Frequency Of Noise	Group I	Group II
250 Hz	65 db	60 db
8000 Hz	97 db	90 db

It will thus be appreciated that this invention at least in the form of the embodiment described provides a novel and useful improvement to circular cutting blades. Clearly however the example disclosed is only the currently preferred form of the invention and a wide variety of modifications may be made which would be apparent to a person skilled in the art. For example the shape, spacing and relative size of the apertures may vary from those described.

The claims defining the invention are as follows:

1. A cutting blade for a circular saw, said blade comprising a base with a cutting edge around the periphery which is impregnated with superhard material and a bore at the centre thereof for mounting on a saw drive shaft wherein a plurality of noise damping apertures are formed through the area of the base between said centre bore and said cutting edge, the area of said apertures comprising at least 5% of the area of the blade whereby the opposing edges of said apertures remain separated at working temperatures and the sum of the circumferential angles of the sectors delimited by said apertures being at least  $360^{\circ}$ .

2. The cutting blade as claimed in claim 1 wherein the apertures are in the forms of circles and/or other geometrics comprising of circular arc(s) and/or straight(s) and/or curved line(s).

3. The cutting blade as claimed in claim 1 or claim 2 wherein the blade includes a plurality of equally spaced slots or holes adjacent said cutting edge for dry cutting operations and said apertures are located in an area between said centre bore and said holes or slots.

Dated this *31<sup>st</sup>* day of *October* 1996

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By Our Patent Attorney  
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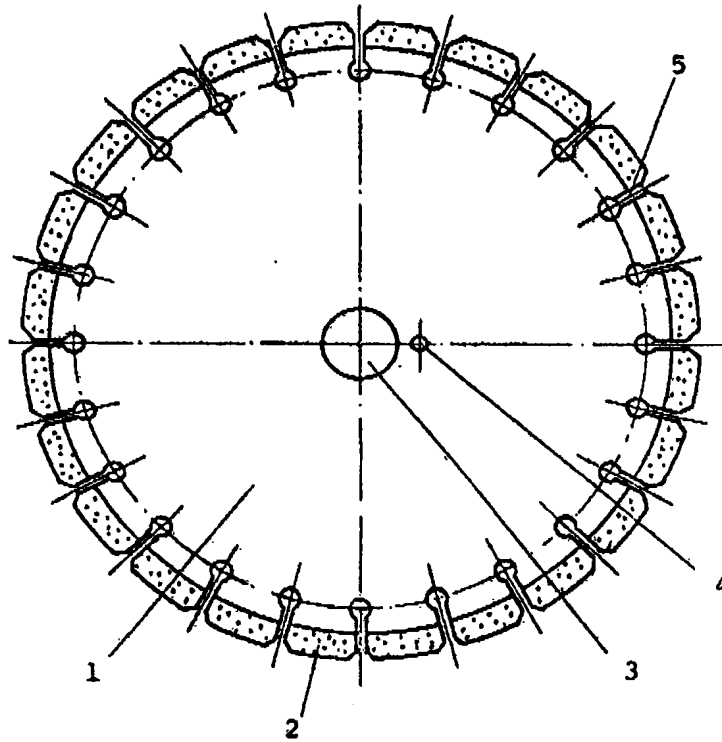


FIGURE 1

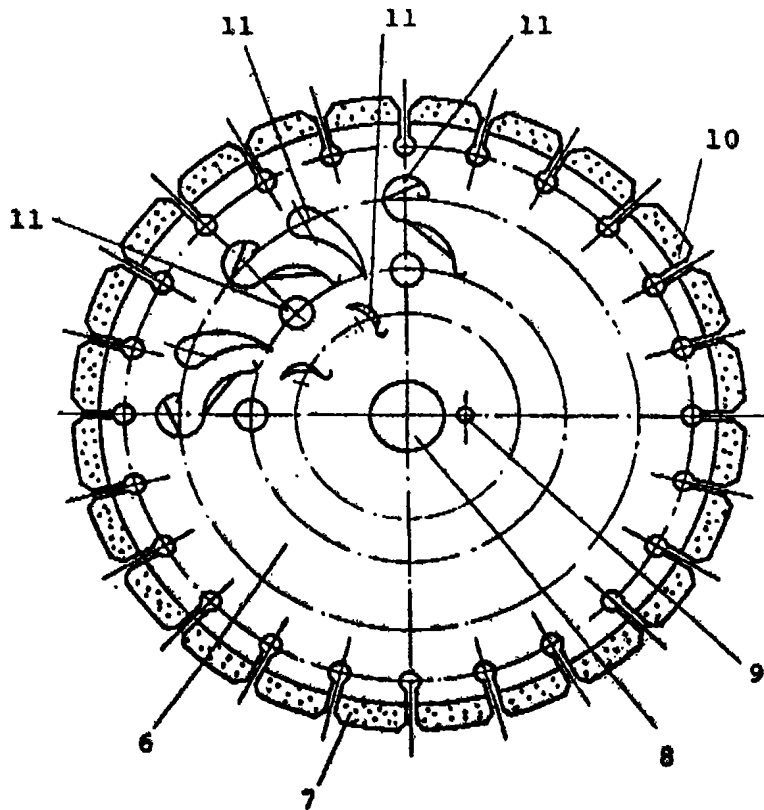


FIGURE 2

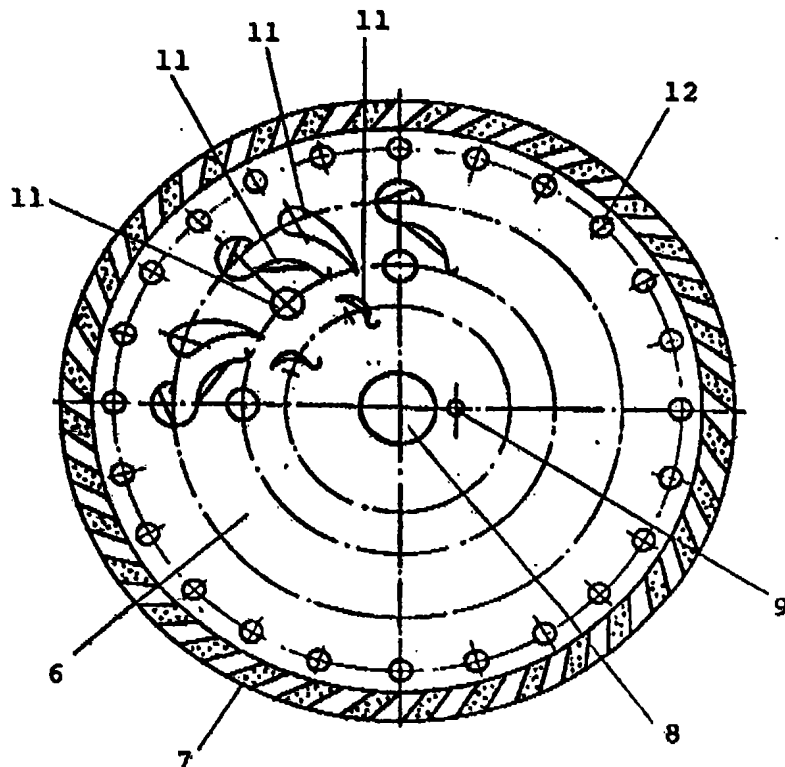


FIGURE 3

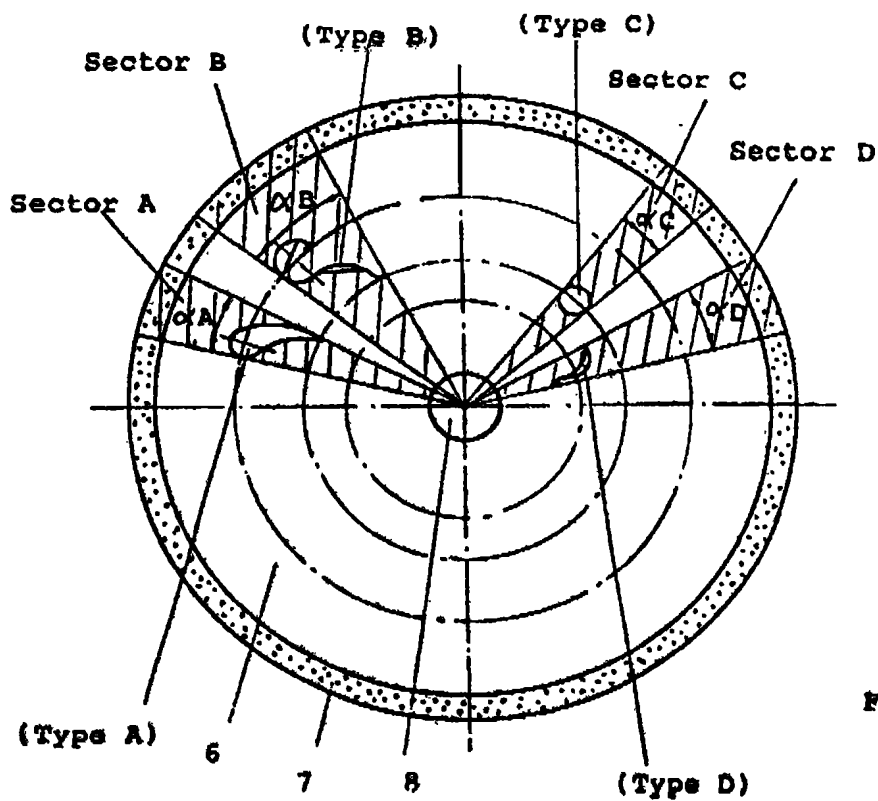


FIGURE 4